



Vision Data Acquisition Software

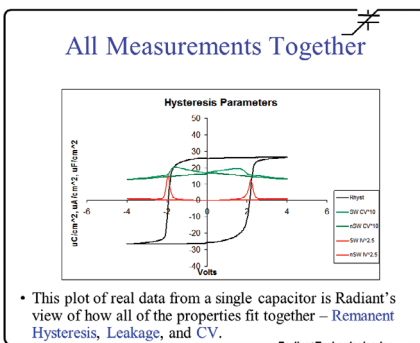
Vision is a revolutionary software package that provides exceptional freedom to design, conduct, and review all procedures associated with any material experiment. The Vision test environment will collect all data acquired in a test sequence and organize it in archived data structures along with the test sequence definitions and data analysis tools. The experiment can always be recalled or reproduced. Data and test conditions can be shared over the Internet to allow collaborative research.

The Power of Vision Test Definitions and DataSets

Radiant's Precision Line of Test Systems are driven by Vision Software. Vision Software is a framework that loads a variable series of independent agents known as Tasks. Tasks are configurable objects that perform the procedures of an experiment and collect and analyze any measured data. Such an experiment is called a Test Definition.

The true power of Vision is in grouping Tasks together in Test Definitions to form custom experiments (DataSets) so the user is not tied to running one specific task at a time. The Test Definition may consist of any number of Measurement Tasks. Researchers can create a dataset to hold any number of arbitrary Test Definitions that are executed from inside the dataset to save and document the data forever. Vision's "Innovative Test Editor" let's researchers create and document complex Test Definitions using computer icons to represent Tasks.

All Tasks include a Task Instructions button on their configuration (and data presentation) dialogs. The Task Instruction pages include Task theory, where appropriate, a complete and detailed discussion of every control on the configuration dialog, a detailed discussion of the Task execution and a history of changes to the Task.



Hardware Tasks

These are Tasks that send signals to a tester through the driver. These also may communicate with other instruments attached to the tester or to the host computer. Hardware Tasks normally apply a voltage profile to the sample. Testers may apply voltages of up to ± 10 Volts, ± 100 Volts, ± 200 Volts, or ± 500.0 Volts depending on tester model. Voltages of up to $\pm 10,000$ Volts may be applied with the addition of an accessory High-Voltage Interface (HVI) and High Voltage Amplifier (HVA). Hardware Tasks include:

WAVEFORM

Applies a sine, square, triangle or user-defined voltage waveform to stress the sample. The waveform is of user-defined voltage, frequency and duration.

DC BIAS

Applies a constant user-defined voltage to the sample for a user-defined duration.

Measurement Tasks

These are Hardware Tasks that receive data from the tester. Measurement Tasks include, but are not limited to:

HYSTERESIS

This Task measures sample polarization ($\mu\text{C}/\text{cm}^2$) response to a Task-applied voltage profile. The profile is of user-specified maximum voltage and period (ms) (Period = $1000/\text{frequency}$) Profiles are normally standard bipolar (triangular), but may be monopolar, sinusoidal or user-specified.

SMALL SIGNAL CAPACITANCE

This measurement captures the samples capacitance as a function of voltage. It measures the capacitance at each voltage step using a very small stimulus signal to eliminate polarization switching components of the sample response.

PUND

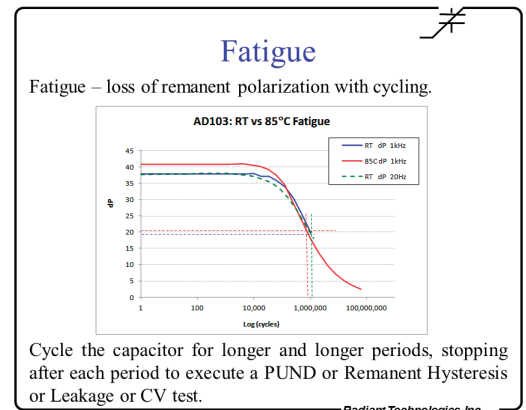
A standard five-pulse ferroelectric sample characterization measurement that captures both switching (remanent + nonremanent) and non-switching (non-remanent) polarization ($\mu\text{C}/\text{cm}^2$). Pulse width and voltage are under user control.

LEAKAGE

Captures the current through a sample induced by a steady-state, DC Bias voltage. Voltage and measurement duration are user-defined.

FATIGUE

Performs a series of stress/measure sequences. In the stress sequence the sample is submitted to a switching waveform. At the end of the waveform period, a PUND measurement is made to capture the sample's polarization response. Each subsequent stress period may have its duration increased to better serve a logarithmic analysis.



GENERAL MONOPOLAR

The General Monopolar Task allows up to five independently configured monopolar Hysteresis measurements to be made in sequence in order to execute a PUND measurement using continuous waveforms. Each measurement may be preceded by an unmeasured presetting pulse or poling DC Bias period.

CURVE ENERGY

Determines the energy returned and the energy lost from a charged capacitor. It is useful for measuring power capacitors for new energy generating systems.

PIEZO-ELECTRIC

Captures a sample's displacement as a function of voltage profile along with the sample's polarization response. An external displacement measurement instrument must be attached to the tester to make this measurement.

PYRO-ELECTRIC

Sets the sample to a series of temperature by performing GPIB control of an external thermal device. At each temperature it captures the sample's polarization response and/or small-signal capacitance. These are combined to calculate the pyroelectric coefficient.

MAGNETOELECTRIC

Radiant's new Magnetolectric Response Task allows the user to measure the magnetolectric coupling coefficient in multiferroic materials and composite magnetopiezoelectric devices. The test stimulates a sample with a small AC magnetic field while measuring its charge generation.

TRANSISTOR

Radiant has introduced an I²C digital-to-analog converter product that can be attached to the Precision Premier II or Multiferroic Test System and is controlled from Vision. The addition of this extra voltage source makes it possible for the testers to measure the performance of thin-ferroelectric-film gate transistors (TFFT and MFSFETs).

DLTS

Deep Level Trap Spectroscopy Task allows the user to measure the population of traps filled during a voltage pulse of a non-linear material and measure the decay rate of the trapped population as a function of temperature.

PAINT

PAINT originally was designed to capture the mechanical and acoustic vibrations induced in an ink jet chamber by the pulsing of the piezoelectric element to fire an ink droplet. In reality, the PAINT task in Vision can be used to capture the acoustic response of any activity, including SONAR type measurements in a water tank.

External Instrument Control

These are Hardware Tasks that communicate with remote instruments through a GPIB bus.

LCR METER

This task allows the user to query an external LCR meter for its measurements including capacitance, loss, and Tan Delta.

SET FIELD

This task allows the user to specify a setting for the superconducting magnet connected to a Quantum Design 6000 controller.

TEMPERATURE

This Task sets the sample to a series of temperature by performing GPIB control of an external thermal device. At each temperature it captures the sample's polarization response and/or small-signal capacitance. These are combined to calculate the pyroelectric coefficient.

Filters

These are Tasks that collect, operate on, store and plot data from one or more Measurement Tasks or other Filters. Filter categories include:

COLLECT/PLOT	Simple data collection and plotting.
MATHEMATICAL ANALYSIS	Combine two measured data vectors into one through addition, subtraction, multiplication or division or perform single vector manipulation on one or more input data vectors. Single vector operations include linear scaling and offset, integration and differentiation.
AVERAGING	Average multiple data vectors together to form a single vector, average one or more single vectors with itself over multiple iterations in a Branch Loop or perform statistical analysis on one or more single vectors. Statistical analysis includes maximum, minimum, mean and standard deviation.
DATA MINING	Invoking the data mining wizard allows the user to sort through all of the DataSets on the computer to pull out and plot together any tests. With DM, it is now possible to create plots showing the entire lifetime of a particular sample even if that lifetime involves years of tests. It is also possible to compare the sample response to small changes in the same test run on that sample

External Sensor Control

These are Tasks that document and/or control the progress of an experiment.

SENSOR 2 COLLECT/PLOT FILTER	Now, the user can separately plot the measurements on SENSOR 2 of the LCII, Premier, and Multiferroic and apply all of the math filters to process the results.
READ SENSOR TASKS	These Tasks allow the user to directly take a reading of the voltage on SENSOR or SENSOR 2 without having to execute a subsidiary task like Hysteresis.
SENSOR OSCILLOSCOPE	The oscilloscope task presents a real time display of the voltage on one of the sensor ports of the LCII, Premier, or Multiferroic testers.

ADDITIONAL DATA FILTERS AND MEASUREMENT TASKS HAVE BEEN ADDED TO THE VISION LIBRARY INCLUDING:

- 1 The plotting of Sensor 2 measurements.
- 2 Noise reduction Tasks.
- 3 Setting a magnetic field over GPIB.
- 4 Triggering external instruments from the SYNC signal.
- 5 Independent sensor read Tasks.
- 6 Capture of capacitor response to real-time environmental stimuli.
- 7 Measurement of capacitor transients after a pulse.
- 8 Movies - Vision now has the capacity to export JPEG images of its plots real time during Test Definition Execution. These JPEG images are titled and ordered in a manner that allows quick import into movie maker programs.

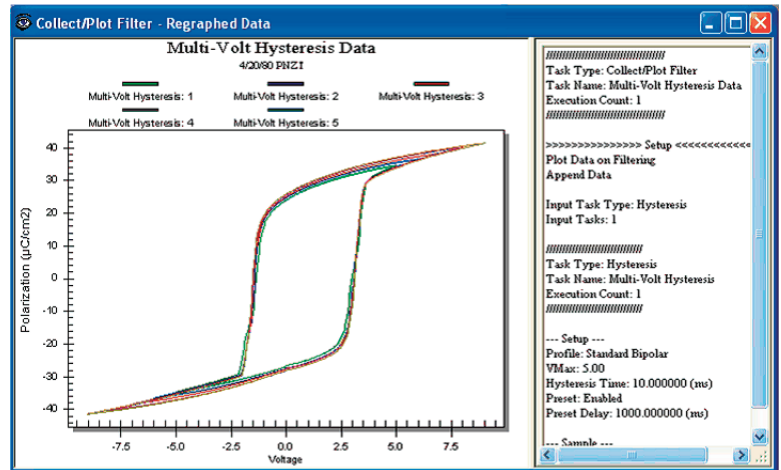


Figure 1 - Collect/Plot Filter Data - Multi-Volt Hysteresis Loop

Please do not hesitate to contact us with any questions, comments, or concerns.

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